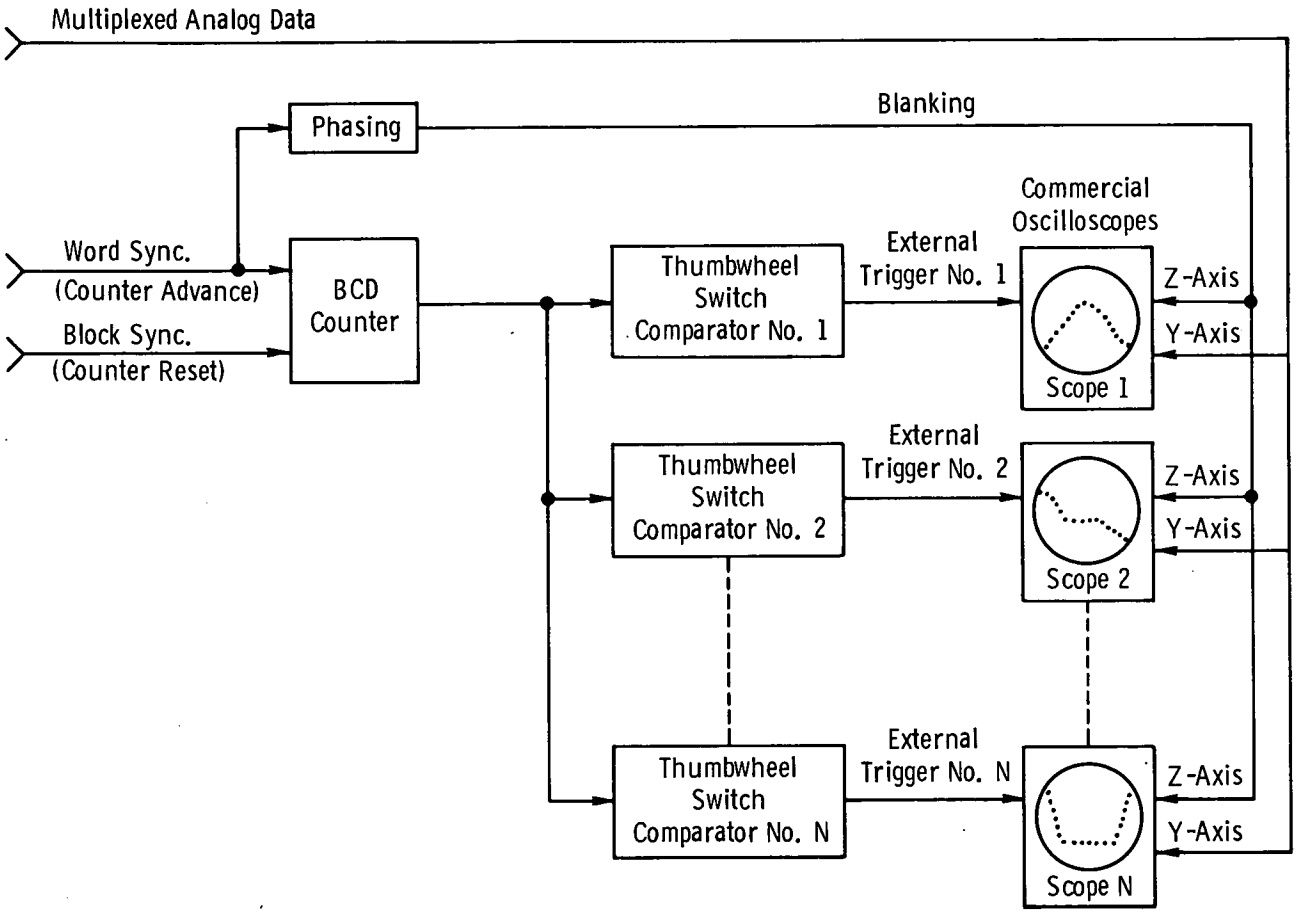
NASA TECH BRIEF

Lewis Research Center

A REMOTE TEST PARAMETER PROFILE DISPLAY



The Problem:

To obtain a profile plot display of many analog test parameter values relative to each other and whose values vary with real time. The system must be capable of easy, rapid set-up; must use a minimum of input cabling; must be low cost; must be capable of being expanded to any number of displays; and must be portable.

The Solution:

A multiplexed digital recording system with a simple interface between it and standard commercially available oscilloscopes. All of the digital data is routed through a single digital to analog (D/A) converter. The result is a serial presentation of analog data for consecutive channels in the multiplexer pattern. The D/A serial data are then input to the Y-axis of a commercially available oscilloscope.

(continued overleaf)

How It's Done:

The digital recording system provides two control parameters, word sync, a pulse that occurs for each digital data word that is input to the D/A converter, and block sync, a pulse that occurs each time the multiplexer recycles to the beginning of the sampling order. These sync signals are used to remotely derive a block position count (see figure). The word sync and block sync are input to a binary coded decimal (BCD) counter. The block sync is used to reset the counter and the word sync is used to advance the counter. The BCD counter output is continuously compared with a block position selected on a set of remotely located thumbwheel switches. When the counter and switches compare, a signal is developed for externally triggering the X axis sweep of an oscilloscope trace. This permits the oscilloscope trace to begin at any selected position in the data block.

The oscilloscope trace will begin to sweep and will display the D/A serial data beginning with the parameter selected by the block position on the thumbwheel switches. The number of parameters displayed is then controlled by the time base selector of the oscilloscope.

The area of data which is to be graphically displayed may be located anywhere in the total data block; but, each parameter to be displayed must be located in consecutively sampled channels.

The data that are displayed on the Y axis of the screen will be the consecutive analog data samples, starting with the parameter occurring at the selected block position. The analog data samples are provided by a D/A converter fed with all consecutive data words derived by the data acquisition system.

A Z axis blanking and unblanking function is used to remove frequency response problems and level transitions between consecutive parameter samples. Only the true "steady" portions of the sampled data will be displayed. The "rising" portion of each sampled word can be blanked out. Current levels of displayed data will appear as discrete level segments or dots.

Notes:

1. Any number of displays may be incorporated simply by adding one set of thumbwheel switches, one trigger generator, and one oscilloscope per display. The entire system of N displays requires only three coaxial inputs – "Multiplexed Analog Data," "Word Sync," and "Block Sync." Each display is completely independent of every other display.
2. Commercially available bar graph display systems cost approximately $3000/display while the cost for this system runs $150/display with the cost of the first display at $1200.
3. Documentation may be obtained from:
   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B73-10006

Patent Status:

NASA has decided not to apply for a patent.

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